Q.628.3
Il63c
1975/76

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

DIVISION OF WATER POLLUTION CONTROL

CRITERIA FOR DETERMINING CONSTRUCTION GRANT PRIORITIES FOR MUNICIPAL SEWAGE TREATMENT WORKS NEEDS

FISCAL YEAR 1976

THE LIBRARY OF THE
AUG 1975
URBANA-CHAMPAIGN

MAY, 1975

Digitized by the Internet Archive
in 2017 with funding from
University of Illinois Urbana-Champaign Alternates

https://archive.org/details/criteriafordeter1975illi

INTRODUCTION

The Criteria for Determining Municipal Discharge Indices (MDI) (reference Section I) and Grant Priority Indices (GPI) (reference Section II) are identical to the criteria which were used in the determination of these values for Fiscal Year 1975.

The Criteria for Determining Segment Ranking Indices (SRI) are also identical to the criteria which were used in the determination of these values for Fiscal Year 1975. These criteria are available upon request. In addition to the Criteria for Determining SRI, MDI, and GPI values, the following procedures will be followed:

1. Even though a need may appear on the priority list prepared in accordance with the criteria described in Sections I and II, a number of conditions must be met before the implementing project(s) will be unconditionally certified to the United States Environmental Protection Agency as entitled to priority for award of grant:

    a) The grant application must have been filed by an eligible unit of government in a manner consistent with procedures required by the Agency.

    b) The grant application (Step 1, Step 2, or Step 3)* must comply with all applicable requirements set in 40 CFR 35 E. In particular, all grant projects must satisfy all applicable facilities planning requirements, including sewer system evaluation requirements, prior to certification for step 2 or step 3 grant. In addition, step 2 or step 3 projects must satisfy the Federal regulations regarding permit requirements of the National Pollutant Discharge Elimination System.

    c) The grant applicant for a required sewer system survey and/or cost-effective sewer rehabilitation, in the case of a facilities planning area which includes more than one municipality, may be the lead planning agency or any of the municipalities within the area, depending upon the existence or non-existence of contracts for the performance of the work by the lead planning agency. The costs of approved survey work and cost-effective sewer rehabilitation will be eligible for grant consideration under the priority of the sewage treatment plant and/or intercepting sewer project to which the sewer collection system is or will be tributary. This provision does allow the award of grants for sewer system surveys and cost-effective sewer rehabilitation to municipalities which had not filed an application for grant at the time of preparation of the priority list for the fiscal year.

---

* A step 1 grant would generally be offered for facilities planning and/or related elements; a step 2 grant would be offered for the preparation of construction plans and specifications; and a step 3 grant would be offered for the physical construction of a treatment works.

d) No grant or combination of grants will be certified in an amount which will allow a single applicant or a service area of a single applicant to receive more than 50 percent of the available Federal and State grant funds, unless such an award or combination of awards is deemed by the Director of the Agency to be in the best interests of the citizens of Illinois.

2. Needs which consist of plant improvements and/or intercepting sewers, and which will be satisfied through construction of several phases (projects), will be addressed by scoring all phases (projects) with the full credit for the entire need.

3. Two or more needs of one or more applicants, which are initially ranked at different priorities, may be consolidated into one need at the higher (highest) priority, if the following conditions are satisfied:

   a) The facilities plan, prepared by an applicant and approved by the Agency, must conclude that the two or more needs are integrally related through the cost-effective solution.

   b) Available State and Federal funds must be adequate to permit complete funding of the consolidated need.

   Such consolidations may include:

   a) sewer rehabilitation work and sewage treatment plant improvements and/or intercepting sewer construction;

   b) projects to eliminate on-system wet weather overflow and sewage treatment plant improvements and/or intercepting sewer construction;

c) projects to construct collection systems and new sewage treatment plant and/or intercepting sewer construction.

4. Needs which consist of the diversion of a significant portion of the average dry weather flow from one plant to another plant will be scored utilizing the regionalization convention for the two plants.

5. Needs on the approved priority list for which Federal or State funds are available at the time of approval of the list (after deduction of the reserves specified below) to provide funding through step 3 will retain their priority position until a step 3 grant has been awarded, or until the need represented by that priority rank has been satisfied, provided that the applicant is progressing in a satisfactory manner toward satisfying the applicable grant application requirements of 40 CFR 35 E.

6. To prevent the possible loss of Federal funds to the State, provisions will be made to obligate those Federal funds allocated to the state which are not obligated as of February 1 of the year in which the allotment period for the funds expire. The provisions may include amending the project priority list by deletion and/or addition of projects.

   a) As required by the provisions of 40 CFR 35.915(g), a reserve of no less than five percent of each fiscal year's allotment of Federal funds will be established for use in funding of grant increases. The amount of this reserve will be specified in the State's annual Water Pollution Control Program Plan, and may be amended as necessary.

   b) Pursuant to the provisions of 40 CFR 35.915(i), a reserve not to exceed 10% of the current year allotment may be established for use in advanced funding of step 1 and step 2 for projects for which step 3 funds may not yet be available. The amount of this reserve, if established, will be specified for each fiscal year's allotment of federal funds, beginning with FY 1975, by a statement contained in the state's annual Water Pollution Control Program Plan, and may be amended as necessary. Such advanced funding will be awarded in the same manner as grants for high-priority needs which receive commitment of funds through step 3, except that commitment of funds through step 3 will be contingent upon future availability of adequate Federal allotments and/or State appropriations. Needs receiving such advanced funding and which progress in a satisfactory manner shall retain their priority position through award of step 3 grant or until the need represented by that priority rank has been satisfied.

I. PROCEDURE FOR CALCULATING THE MUNICIPAL DISCHARGE INDICES (MDI)

Federal regulations (40 CFR 130.43) require the State to annually prepare a State Municipal Discharge Inventory, which is to be a "ranking of significant municipal discharges". The procedure to be followed in preparing this list requires that all "significant municipal discharges" be ranked and categorized consistent with the rank of the basin segment to which they discharge. The segment ranking is to be an important factor in ranking of municipal dischargers, and the procedures for calculating segment ranking indices are available upon request.

As the first step in developing the Municipal Discharge Inventory it was necessary to define a "significant municipal discharger". The definition which has been developed is based on the concept of eligibility for Federal grant assistance for construction of facilities required to prevent water pollution by the discharge. Sewerage utilities and privately-owned subdivision sewage treatment plants have been omitted since they are not eligible for grants.

In order to carry out the ranking of municipal dischargers, a quantitative formula has been developed which incorporates three considerations for accomplishing the ranking of discharges: (1) quantity of wastewater adjusted for strength; (2) adequacy of existing facilities for treating the existing wastewater load to design level; and (3) adjusted segment ranking index. While only the third of these considerations relates directly to segment ranking, the first two also address criteria required to be used in ranking segments: quantity and strength of wastes and the degree to which wastes are treated at present. These are important considerations in analyzing the severity of pollution problems in a segment. The specific formula which considers these three factors is designed to produce a "Municipal Discharge Index" value (MDI) which becomes an important determinant of priority for grant assistance to the discharger. The formula is as follows:

F1 = Discharge Quantity Factor

$$= \log_{10}\ (\text{P.E.}^{*}_{\text{BOD}}\text{, existing load})^{**}$$

Range of values: 0 - 6.9626

F2 = Existing Facility Adequacy Factor

$$= \left[\frac{\text{P.E.}^{*}_{\text{BOD}}\text{, existing load (industrial \& domestic)}^{**}}{\text{P.E.}^{*}_{\text{BOD}}\text{, existing design capacity}}\right]$$

$$\times \left[\frac{\text{daily average flow, existing load}^{**}}{\text{daily average flow, existing design capacity}}\right] + 1.0$$

Range of values: 1 - 14.646

F3 = Adjusted Segment Ranking Index

$$= \left[\frac{\text{SRI, receiving segment}}{\text{SRI, maximum statewide value}}\right]$$

SRI min. = 179.00
SRI max. = 562.60

Range of values: 0.320 - 1.000

MDI = Municipal Discharge Index

= F1 x F2 x F3

Range of values: 0 - 30.374

At the time of scoring of a need for priority, in situations where other construction is underway or where other construction has been completed for expansion of capacity and/or increased degree of treatment, the priority score will reflect the construction (score will be less) if, at the time of the application filing deadline, the approved estimate of work in place indicates 100 percent completion of all portions of the contract except miscellaneous work.

Using this formula, the "worst" municipal discharge is identified by the largest MDI value of 30.374 and the municipal discharge least in need of attention from the Agency is the one whose MDI value is 0.

---

* 1 PE_{BOD} = 0.17 lbs. of 5-day biochemical oxygen demand per day.

** Where the applicant justifies hydraulic and organic loadings on the basis of influent sampling and flow measurement results for a current 12 month period these justified values will be used. In cases where influent sampling and/or flow measurement results are not available for a current 12 month period and where the applicant justifies estimated connected demestic PE and provides (measured) industrial PE and/or where the applicant provides estimated flow based on 100 gpcpd and provides (measured) industrial flow, these justified values will be used.

II. PROCEDURE FOR CALCULATING THE GRANT PRIORITY INDICES (GPI)

Federal guidelines for preparation of the Construction Grant Project List (40 CFR 35.554-3, Sub-Paragraph (a)(1)) provide that the same four criteria used for ranking basin segments, namely severity of pollution problems, population affected, need for preservation of high quality waters, and national priorities as determined by the Administrator shall be considered in setting priorities for funding of grants, and provide that the priorities for grants be consistent with the ranking of discharges in the Municipal Discharge Inventory. The sequence in the Municipal Discharge Inventory need not be followed rigidly; however, so long as projects to be funded are concentrated in high priority areas and segments.

The procedure recognizes that the four segment ranking criteria are fully considered in development of the Municipal Discharge Inventory. The MDI value derived by the procedure previously described is used as an input to a formula which produces a "Grant Priority Index" for each need. The basic concept is that the MDI value reflects the seriousness of a discharge as a water quality problem. To derive a Grant Priority Index (GPI) value, it is also necessary to consider the corrective measures required to provide the degree of treatment needed for meeting State effluent standards or other effluent limitations. This is accomplished through a scoring procedure which:

1) establishes relative values for secondary, tertiary, advanced and supplemental treatment processes for the treatment of average daily dry weather flow and maximum daily dry weather flow; primary treatment and disinfection of maximum wet weather flow; rehabilitation of existing processes and expansion of sludge disposal facilities; and construction of new trunk and lateral sewers

2) assigns the established values for

   a) addition of secondary and/or tertiary and/or advanced and/or supplemental treatment processes where at the present time, the processes to be added by the project are entirely lacking; where the additional treatment processes required would be based on the following dilution ratios:

Dilution Ratio	Processes Required*
Greater than 5:1	Primary, Secondary
Greater than 1:1 and less than 5:1	Primary, Secondary, Tertiary Nitrogen Removal
Less than 1:1	Primary, Secondary, Tertiary Advanced, Nitrogen Removal

* Some project may also require phosphorus removal or nitrogen removal regardless of their dilution ratio.

b) additional capacity for currently (hydraulically and/or organically) overloaded treatment processes: If the average daily flow or the connected population equivalent (for a 12 month period) exceeds the design of any of the treatment processes (exclusive of sludge beds), the entire treatment plant will be classified as overloaded.

For an overloaded facility, values from the table of F4 values for the average and maximum design flow for existing treatment processes (as well as 6 points for sludge handling facilities) will be assigned to the project.

For a facility which is not overloaded as defined above, but where sludge bed capacity is presently inadequate, 6 points for sludge handling facilities will be assigned to the project. Sludge beds will be determined to be inadequate where the connected population equivalent (for a 12 month period) exceeds the design basis of the sludge beds.

If the facility is not overloaded based on the average daily flow, the project may receive credit for overloading on the maximum dry weather flow. Where the applicant justifies, on the basis of influent flow measurement for a 12 month period that the average of the peak dry weather flows to the plant exceeds the rated peak capacity of the plant for complete treatment of dry weather flow (where rated peak capacity is normally 2 1/2 times rated capacity for average daily dry weather flow), the project will receive credit for overloading under maximum dry weather flow conditions.

c) needs which involve the upgrading of an existing treatment plant will be credited with one point for "Rehabilitation of existing processes or modifications which do not increase capacity or degree of treatment".

,or

d) the construction of new trunk and lateral sewers where, at the present time, the sewers are lacking, or the rehabilitation of existing sewers where rehabilitation will not eliminate excessive infiltration/inflow.

Based on the above assignment of values, a multiplication factor to convert a MDI to a GPI, namely F4, is derived through a summation of the assigned values for the need:

F4 = Point values assigned for additional treatment processes required.

+ currently overloaded facilities

+ rehabilitation

Specifically the established F4 values are the following:

TABLE OF F4 VALUES

Treatment Process	Average Dry Weather Flow	Maximum Dry Weather Flow	Maximum Wet Weather Flow
Primary	0	0	8
Secondary	14	10	0
Tertiary (10/12)	8	6	0
Advanced (4/5)	4	2	0
Disinfection	6	6	6
Phosphorus Removal	5	3	0
Nitrogen Removal	8	6	0
Inadequate Sludge Handling Facilities			6
Rehabilitation of existing processes or modifications which do not increase capacity or degree of treatment			1

, or

Trunk and/or Lateral Sewers			1

Range of Values: 0 to 99

After the value of F4 is determined, the GPI value for each need is calculated:

GPI = Grant Priority Index

= MDI x F4

Range of values: 0 - 2,400

Needs are ranked for grant funding priority in decreasing order of GPI value; thus the larger the GPI value, the higher the grant priority.

Specifically, the priority system just described is applied with the following conventions and general results (see Appendix I to this document for examples of each of the following general cases):

1) Expansion and/or upgrading of an existing sewage treatment plant, or construction of a new sewage treatment plant, or sewer rehabilitation work to eliminate excessive infiltration and/or inflow:

   a) expansion and/or upgrading of an existing sewage treatment plant or sewer rehabilitation work which will eliminate excessive infiltration and/or inflow: the MDI value for the plant, together with the F4 value for the treatment processes affected at the plant* are used to calculate the GPI value for the need.

   b) construction of a new sewage treatment plant for a currently unsewered community: since a discharge does not yet exist, a MDI value (Municipal Discharge Index) does not exist, and an "artificial" MDI value must be calculated. For this purpose, estimated current population equivalent of the area to be served is used in calculating F1; F2 is set equal to 1.0; and the segment to receive the proposed discharge determines F3. The MDI is then calculated (MDI = F1 x F2 x F3). The treatment processes required at the proposed sewage treatment plant determine F4. The GPI is then calculated (GPI = MDI x F4).

---

* Sewer rehabilitation projects:

A) where the sewer rehabilitation work will solve an inflow problem, the F4 value shall be determined from the existing need** for provision of adequate primary treatment and/or disinfection for wet weather flow in the excess of maximum dry weather flow.

B) where the sewer rehabilitation work will solve an infiltration problem, the F4 value shall be determined from the existing need** for provision of adequate primary and/or secondary and/or tertiary and/or advanced and/or supplemental treatment for dry weather flow.

C) where the sewer rehabilitation work will solve an infiltration and inflow problem, the F4 value shall be determined from the existing need** for provision of adequate primary and/or secondary and/or tertiary and/or advanced and/or supplemental treatment of dry weather flow as well as the existing need for provision of primary and/or disinfection of wet weather flow in excess of maximum dry weather flow.

** Existing need should be determined using overload/no overload criteria for existing treatment processes and dilution ratio for additional processes required by standards.

c) construction of a new regional plant or expansion and/or upgrading of an existing sewage treatment plant to phase out one or more existing sewage treatment plants: the highest of the MDI values as well as the highest of the F4 values among the values for the existing or proposed regional plant and the values for the existing plant(s) to be phased out (exclusive of non-municipally owned treatment works) are used to calculate the GPI for the regional plant.

d) construction of a new sewage treatment plant for a currently unsewered community where a discharge of raw or partially treated sewage does exist.* A MDI value (municipal discharge index) does not exist, and an "equivalent" MDI must be calculated. For this purpose, estimated current population equivalent of the area to be served is used in calculating F1; F2 is set equal to 2.0; and the segment to receive the proposed discharge determines F3. The MDI is then calculated (MDI = F1 x F2 x F3). The treatment processes required at the proposed sewage treatment plant determined F4. The GPI is then calculated (GPI = MDI x F4).

2) Construction of an interceptor sewer:

a) transport of sewage from end point(s) of existing collection system(s) to an existing or proposed treatment plant other than the plant(s) to be phased out: proceed in a manner identical to the procedure in 1c above.

b) transport of sewage from end point(s) of proposed collection system(s) to an existing or proposed regional treatment plant: the calculation of the F1 and F2 values proceeds similarly to 1b above. The F4 value will be selected from the larger of the values for the degree(s) of treatment which would be required at the local location of the collection system and at the regional plant. The F3 value will also be selected from the larger of the value(s) for the basin segment containing the pollution system and the basin segment containing the regional plant.

---

[*] A point discharge of raw or partially treated sewage exists for purposes of determining priority if the applicant establishes that the PE_{BOD}^{**} of the discharge from the sewer system is at least equal to 65 percent of the total domestic population plus 100 percent of any tributary industrial PE_{BOD}^{**}, on the basis of no less than three samples (24 hour composite) of the discharge, collected directly from the sewer system outfall to the receiving stream and corresponding comparable flow measurements of the discharge, on different days. Copies of laboratory reports must be submitted as a part of the "Priority Scoring Summary" to permit a need to qualify under these criteria, and an on-site investigation by Agency representatives may be made, in which case the Agency investigation results will be considered conclusive for scoring purposes.

[**] See asterisk on page 6.

   c) construction of an interceptor sewer for a currently unsewered community where a discharge of raw or partially treated sewage does exist.* A MDI value (Municipal Discharge Index) does not exist, and an "equivalent" MDI must be calculated. For this purpose, estimated current population equivalent of the area to be served is used in calculating F1; F2 is set equal to 2.0; and the segment to receive the proposed discharge determined F3. The MDI is then calculated (MDI = F1 x F2 x F3). The treatment processes required at the proposed sewage treatment plant determined F4. The GPI is then calculated (GPI = MDI x F4).

3) Elimination or treatment of on-system wet weather overflow(s): Regardless of the approach to a solution of this problem** or the extensiveness of the problem, the MDI for the plant currently providing service, and an F4 value of 14 (established values for primary treatment and disinfection of maximum wet weather flow) are used in the calculation of a GPI value.

4) Construction of trunk and lateral sewers:

   a) rehabilitation work which will not eliminate excessive infiltration/inflow: the MDI value for the plant, together with an F4 value of 1 are used to determine the GPI value, and therefore, GPI = MDI.

   b) complete new collection system: the calculation of the GPI value proceeds similarly to case 1b above, except that in this case F4 = 1, and therefore, GPI = MDI.

   c) extension of service by an existing collection system: the calculation of the GPI value proceeds similarly to case 2b above, except that in this case an estimate of the existing population equivalent to be served by the sanitary sewer extension only is used in determining F1, and then GPI = MDI.

5) Expansion and/or upgrading of an existing waste treatment plant or construction of a new waste treatment plant or construction of an interceptor sewer for wastes from water treatment plants:

   In this case the population equivalent based on suspended solids*** is used in place of the population equivalent based on biochemical oxygen demand. In the case of a need to provide treatment of such wastes where none is presently provided, a value of 2.0 is used for F2 in the calculation of MDI and then GPI = MDI x F4. If a need consists of an interceptor sewer, the appropriate convention in (2) above is followed; otherwise, the convention in (1) above is followed.

6) wastewater recycling project: the MDI value for the plant, together with an F4 value of 1 are used to determine the GPI value, and therefore, GPI = MDI.

---

* See asterisk on page 6.

** See asterisk on page 10.

*** 1 PE_{SS} equals 0.22 lbs. of suspended solids per day.

APPENDIX 1

TYPE OF PROJECT	F1	F2	F3	F4
1) Treatment Plant				
a) Expansion and/or upgrading of an existing facility, and/or sewer rehabilitation work to eliminate excessive infiltration and/or inflow.	$\log_{10}$ (P.E.$_{BOD}$, existing load)	$\left[\frac{\text{P.E.}_{BOD}\text{, existing load}}{\text{P.E.}_{BOD}\text{, existing design cap.}} \times \frac{\text{daily avg. flow, existing load}}{\text{daily avg. flow, existing design cap.}}\right] + 1$	$\frac{\text{SRI, receiving segment}}{\text{SRI, max. statewide value}}$	Accumulative score for the plant additions and expansions as required.
b) A proposed sewage treatment plant which will provide treatment for a currently unsewered community	$\log_{10}$ (estimated current PE$_{BOD}$ to be served by the proposed sewage treatment plant)	1.0	$\frac{\text{SRI, proposed receiving segment}}{\text{SRI, max. statewide value}}$	Accumulative score for the degree of treatment required.
c) Regional sewage treatment plant which will phase out one or more facilities	----------------------------Use the largest MDI value among the values for the facilities to be phased out and the regional plant value.			Use the largest F_4 value among the values for the facilities to be phased out and the regional plant value.
d) A proposed sewage treatment plant which will provide treatment for a currently "unsewered" community which has a pollutional discharge.	$\log_{10}$ (estimated current PE$_{BOD}$ to be served by the proposed sewage treatment plant	2.0	$\frac{\text{SRI, proposed receiving segment}}{\text{SRI, max. statewide value}}$	Accumulative score for the degree of treatment required.
2) Interceptor Sewers				
a) An interceptor sewer for the transport of sewage from facility (ies) to be phased out	------------------------ -Use the largest MDI value among the values for the facilities to be phased out and the regional plant value.			Use the largest F_4 value among the values for the facilities to be phased out and the regional plant value.
b) An interceptor sewer to service an unsewered area	$\log_{10}$ (estimated current PE$_{BOD}$ to be served by the proposed interceptor sewer)	1.0	$\frac{\text{SRI, local or regional plant value}}{\text{SRI, max. statewide value}}$	Use the value for the degree of treatment required at either the regional plant or the alternate (local) plant
c) An interceptor sewer which will provide treatment for a currently "unsewered" community which currently has a pollutional discharge.	$\log_{10}$ (estimated current PE$_{BOD}$ to be served by the proposed interceptor sewer	2.0	$\frac{\text{SRI, local or regional plant value}}{\text{SRI, max. statewide value}}$	Use the value for the degree of treatment required at either the regional plant or the alternate (local) plant
3) On-System Wet Weather Overflow Elimination	----------------------------Use the MDI value for the existing sewage treatment plant (1a)----------------			14
4) Trunk and Lateral Sewer Projects				
a) Rehabilitation work which does not eliminate excessive infiltration/inflow	----------------------------Use the MDI value for the receiving sewage treatment plant--------------------			1
b) Complete new collection system for a currently unsewered community	----------------------------Use the MDI value for the proposed sewage treatment plant (1b)----------------			1
c) Extension of service by an existing collection system	$\log_{10}$ (estimated current PE$_{BOD}$ to be served by the proposed sewer extension)	1.0	$\frac{\text{SRI, receiving segment}}{\text{SRI, max. statewide value}}$	1
5) Water Treatment Plant wastes				
a) New waste treatment facility (no treatment currently provided)	$\log_{10}$ (P.E.$_{SS}$, existing load)	2.0	$\frac{\text{SRI, proposed receiving segment}}{\text{SRI, max. statewide value}}$	Accumulative score for the degree of treatment required.
b) Expansion and/or upgrading of an existing waste treatment facility	$\log_{10}$(P.E.$_{SS}$, existing load)	$\left[\frac{\text{P.E.}_{SS}\text{, existing load}}{\text{P.E.}_{SS}\text{, existing design cap.}} \times \frac{\text{daily avg. flow, existing load}}{\text{daily avg. flow, existing design cap.}}\right] + 1$	$\frac{\text{SRI, receiving segment}}{\text{SRI, max. statewide value}}$	Accumulative score for the additions and expansions as required.
6) Wastewater Recycling	----------------------------Use the MDI value for the existing sewage treatment plant (1a)----------------------			1

Municipal Discharge Index (MDI) = $F_1 x F_2 x F_3$ Grant Priority Index (GPI) = F_4xMDI PE_{BOD}: $1PE_{BOD}$ = 0.17 lbs. of BOD_5 per day
PE_{SS} $1PE_{SS}$ = 0.22 lbs. of suspended solids per day SRI: SRI = Segment Ranking Index